Brown AND Caldwell

Technical Memorandum

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Prepared for: Atlantic Richfield Company

Subject: Bedrock Groundwater Assessment

Date: November 10, 2016

To: Jack Oman, ARC Project Manager

From: Rich Mattucci, BC O&M Manager

Copy to: Dave Seter, EPA

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This *Evaporation Pond Dust Mitigation Technical Memorandum* has been prepared by Brown and Caldwell (BC) on behalf of the Atlantic Richfield Company (ARC) to describe the completion of dust mitigation activities on the Unlined and Lined Evaporation Ponds (UEP and LEP) at the Yerington Mine Site in 2016.

Environmental Products and Application (EP&A) was subcontracted by BC to complete the application of soil stabilization polymer to the surface of the UEP, LEP and portions of the Finger Evaporation ponds (FEP) that were disturbed during a recent drilling activity completed in early 2016. EP&A applied their un-dyed polymer product, Envirotac II (also known as Rhino Snot) over an 8 day period from September 28 through October 5, 2016. The soil stabilization polymer has a 2-year warrantee and requires reapplication approximately every 2 years. EP&A completed the initial application in 2011, and re-application in 2013 (partial), 2014 and 2016.

Application Rate

Per product specifications, polymer was diluted to one part polymer to 8 parts water, and was applied to the pond surface at a rate of approximately 150 gallons of polymer per acre.

Application Method

Polymer was applied by the following two methods: 1) side and rear spray nozzles of a 4,000-gal water truck, and 2) spray application from a Yanmar track-mounted spray vehicle in pond interiors accessible to low-ground pressure type vehicles.

The water truck application method was used for applying product to the side slopes of the UEP and LEP by driving on existing site roads and using the side sprayer to project polymer approximately 25 to 30 feet over the pond embankments to stabilized wind-blown dustthat may have deposited on the slopes. The water truck application achieved acceptable coverage.

Photo 1. Water truck spray application

The water truck was also used for application on areas within the FEP where pond sediments were disturbed by drill rig and vehicle traffic. Only the recently disturbed areas received application rather than the entire pond surface, which is not part of the dust mitigation scope of work.

The Yanmar tracked sprayer was used for application of polymer to the interior pond surfaces and completed the bulk of the application work. The Yanmar moves and sprays at a slower rate than the water truck and can achieve an application coverage area of approximately 30 to 40 acres per day. Limited mobility of the Yanmar necessitates the use of the larger water truck to mix product at the water tank and staging area and then transport and off-load it into the Yanmar tank at an accessible portion of the pond embankment. The Yanmar has a 2,000 gallon tank and one load from the 4,000 gallon water truck can fill the Yanmar tank two times before requiring mixing of a new batch.

Product is applied to the pond by tracking back and forth in parallel tracks approximately 20 feet apart. The operator is careful not to drive on the recently applied surface when tracking back to the embankment for refilling of the tank and also allows for a slightly heavier application at the ends of the rows where turning of the tracks causes more significant disturbance of the pond sediments.

At the completion of each day, a BC representative surveyed the boundary of the application area and calculated acreage using a hand-held Trimble GeoXT Geoexplorer 6000 GPS receiver. Results of the surveys are presented in the attached figures and discussed in the following section.

Photo 2. Transferring product from water truck to Yanmar

Photo 3. Application in the UEP

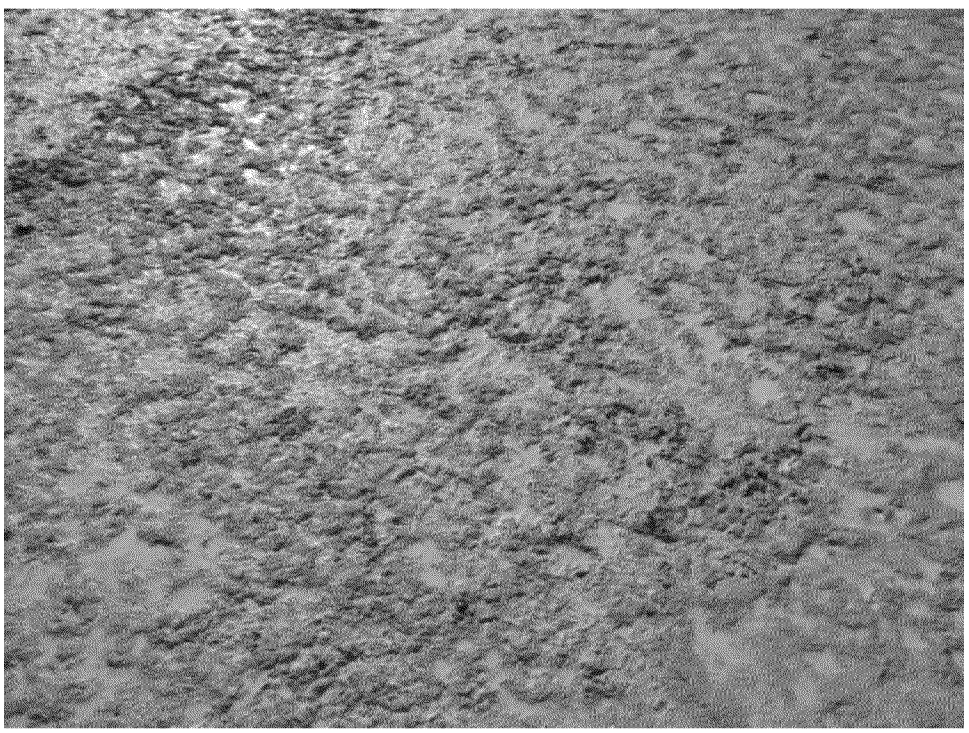

Photo 4. Pond surface after application, not fully dried

Coverage Area

A total of 183.6 acres of the UEP, LEP and FEP received application of soil stabilization polymer during the 2016 dust mitigation program. A summary of the application area acreages are provided in Table 1 and daily activity log is provide in Table 2. Figures showing the surveyed coverage areas are shown in Figures 1, 2 and 3 for the UEP, LEP and FEP respectively.

A small portion of the southern tip of the UEP is excluded from polymer application due to wind-eroded, uneven ground that can be very soft and unable to safely accessed by the application equipment. Therefore, only 92.9% of the total available acreage received application. A larger portion of the LEP is also inaccessible to the Yanmar due to soft acidic sediments in the central portions of the south, middle and north LEP where precipitation water accumulates and stays for long periods of time, never allowing the underlying sediments to fully dry out. A total of 73.9% of the total available acreage of the UEP received application. The inaccessible areas of the LEP that did not receive application typically have a natural hard crust due to the concentration and evaporation of mineralized water which is resistant to dust generation.

Table 1. Application Acreage and Percent Coverage

Location	Acreage	% Coverage
Unlined Evaporation Pond (UEP)		
UEP total available acreage	111.7 ac	93.0%
UEP pond sediments sprayed	98.72 ac	
UEP pond embankments sprayed	5.11 ac	
Lined Evaporation Pond (LEP)		
LEP total available acreage	102.3 ac	73.9%
LEP pond sediments sprayed	69.11 ac	
LEP pond embankments sprayed	6.49 ac	
Finger Evaporation Ponds (FEP)		
FEP pond sediments sprayed	4.13 ac	NA
TOTAL acreage sprayed	183.6 ac	

Table 2. Summary of Dust Suppression Application Daily Activity

Date	Pond	Acreage	Application method	Comments
9/28	FEP	4.13 ac	Water truck	Partial day, test out equipment by spraying Finger ponds
	UEP & LEP	10 ac	Water truck	Spray embankments of UEP and North LEP
9/29	LEP	2 ac	Water truck	Complete remaining LEP embankments; remainder of day receiving product totes and testing Yanmar
9/30	UEP	38.07 ac		Yanmar NE side of UEP
10/1	UEP	30.40 ac		Yanmar SW side of UEP
10/2	UEP	9.30 ac		Yanmar E and W sides of UEP; partial day due to high winds
10/3	UEP	20.95 ac		Yanmar NW corner UEP; partial day due to Yanmar malfunction
10/4	LEP	39.57 ac		Yanmar E side of South and Middle LEP
10/5	LEP	29.54 ac		Yanmar W side of South and Middle LEP, North LEP

Demobilization

EP&A demobilized from the Site on Thursday October 6, including removal of all empty and unused product totes. A transport truck picked up the Yanmar and rental equipment (water truck and forklift) the following week.

Water for the project was supplied by Desert Engineering by water truck filled at a hydrant in the City of Yerington and stored in the on-site temporary water tank set up for this project. The rental water tank was staged near the northeast corner of the UEP and was removed shortly after completion of the work.

Sprayed area

Application area from 9/30 to 10/3/16.

UEP North = 98.72 ac
UEP South = 0.0 ac
UEP Total = 98.72 ac

Approximate Daily Dust Suppression Coverage*

9/30	= 38.07 ac	Acres Sprayed = 98.72 ac
10/1	= 30.40 ac	
10/2	= 9.30 ac	
10/3	= 20.95 ac	

Spray Area Coverage
= 5.11 ac

* Surveyed areas include only the pond sediments areas, no spray on pond edges.

UEP = Unlined Evaporation Pond

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Project: 148734

N W E S

200 0 200 400 FEET

Figure 1
Unlined Evaporation Pond Dust Suppression Project Status as of 10/5/16 (5 pm)

Oct 24, 2016 - 10:37am riohnson
P:\Arco-Yerington\Site O&M Activities\148734 - Year 2016 Files\CAD\Oct2016\Figure 1 - UEP Project Status.dwg

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Sprayed area

Application area from 10/4 to 10/5/16.

Approximate Daily Dust Suppression Coverage*

10/4	=	9.78 ac	Acres Sprayed = 69.11 ac
10/4	=	11.79 ac	
10/4	=	18.00 ac	
10/5	=	3.78 ac	
10/5	=	5.35 ac	
10/5	=	5.07 ac	
10/5	=	15.34 ac	

Spray Area Coverage

= 6.49 ac

* Surveyed areas include only the pond sediments areas, no spray on pond edges.

LEP = Lined Evaporation Pond

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N W E S

150 0 150 300 FEET

Figure 2
Lined Evaporation Pond Dust Suppression Project Status as of 10/5/16 (5 pm)

Oct 24, 2016 - 10:39am rjohnson
P:\Arco-Yerington\Site Oand\M Activities\148734 - Year 2016 Files\CAD\Oct2016\Figure 2 - LEP Project Status.dwg

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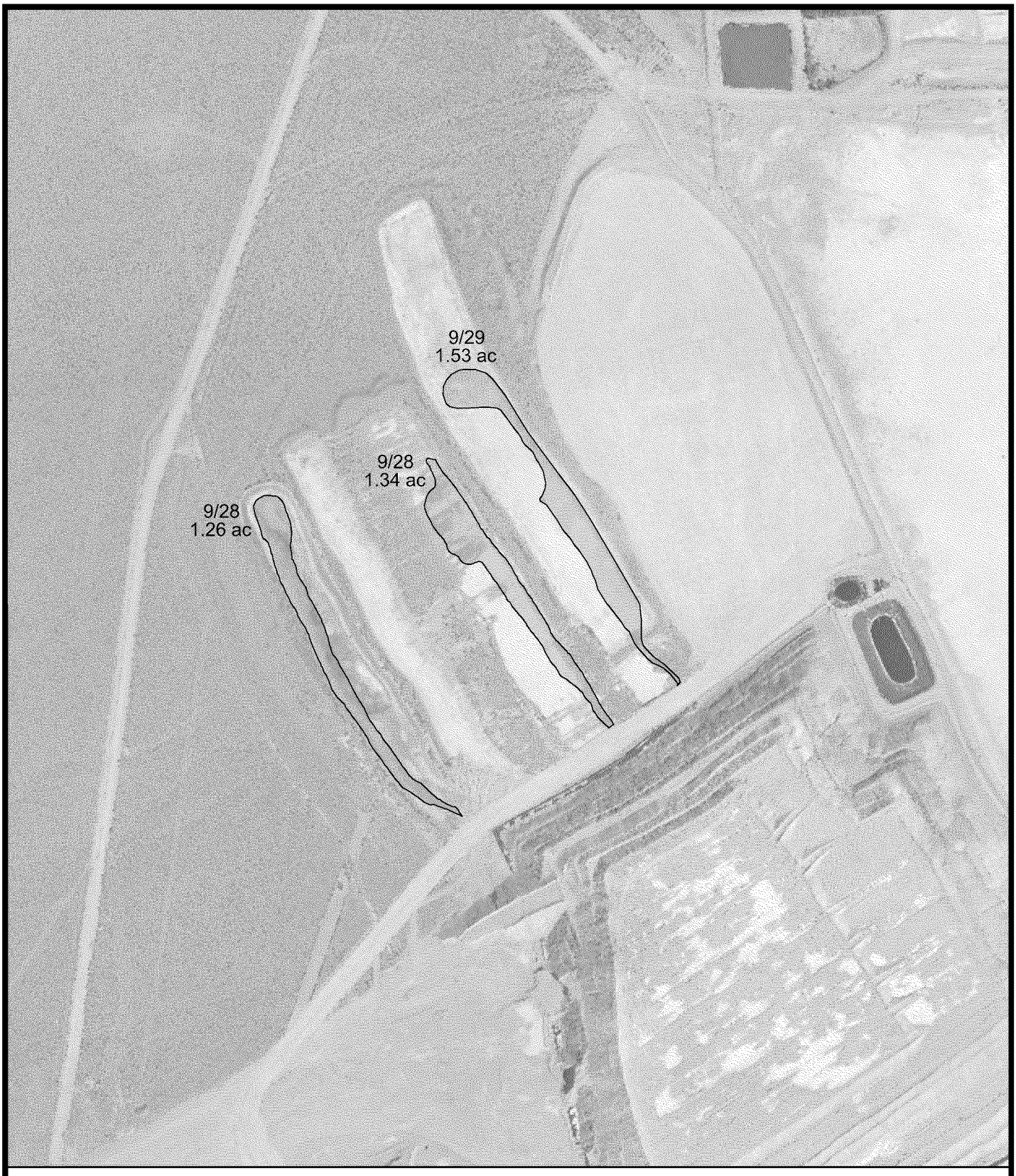

Explanation

Application area from 9/28 to 9/29/16.

Approximate Daily Dust Suppression Coverage*

9/28	=	1.26 ac	Acres Sprayed = 4.13 ac
9/28	=	1.34 ac	
9/29	=	1.53 ac	

* Surveyed areas include only the pond sediments areas, no spray on pond edges.

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N W E S

0 200 400 FEET

Figure 3
Finger Ponds
Dust Suppression Project
Status of 10/5/2016 (5 pm)

Oct 24, 2016 - 10:31am rjohnson
P:\Arco-Yerington\Site OandM Activities\148734 - Year 2016 Files\CAD\Oct2016\Figure 3 - Finger Pond Project Status.dwg